series, which in other parts of Scandinavia play so large a part in our mountain system.

Further details will be published in the year-book (*Aarbog*) of the Geological Survey of Norway for 1890.

Kristiania, November 29. HANS REUSCH.

NOTES.

THE anniversary meeting of the Royal Society was held on Monday at Burlington House. Sir G. Stokes resigned the presidency in favour of Sir William Thomson. The new Council was elected, and Sir G. Stokes presented the medals, a list of which we have already published. The official report of the proceedings is not yet ready. The annual dinner was held at the Hôtel Métropole in the evening, and, as usual, it was very numerously attended. Many of the speeches were so long that it is impossible to reproduce them here, but it is fitting that Dr. Hopkinson's reply for the medallists should be put on record. He said:—"You have done me great honour in asking me to respond to this toast, but the honour carries its burden with it. I could have wished for your sakes that the duty had been in hands abler for its performance. In matters of science, so far as nationality exists at all, it must be held to depend not upon the accidents of government, but upon community of descent and community of language. If you were to ask Prof. Newcomb, I have no doubt he would tell you that he was of the same nation as Bacon and Newton. We are undoubtedly of that nation, it therefore follows that Prof. Newcomb is our fellow-countryman. But intellectually Newcomb is a descendant of Newton in a peculiar sense. Newton not only originated that greatest of all scientific generalizations, the law of universal gravitation, but followed out in some measure its effects in the perturbation of the bodies of the solar system. Newcomb has attained to the proud position he now holds by advancing the theory of gravitation in its application to the details of the motion of the moon and some other of the planetary bodies. When Prof. Newcomb visited Birmingham some 16 years ago, he did me the honour of being my guest. He had then attained a high reputation. I little thought that on the day on which he should receive the highest honour the Royal Society has to bestow, I should myself receive a Royal Medal. Of Prof. Hertz and his work, I could say much of its connection with our own Maxwell, and of its immediate and enthusiastic appreciation in this country; but Prof. Hertz is here to-day, and can answer for himself far better than I could have answered for him. It is one of the boasts of modern science that she can accomplish by inanimate means many results which it was supposed that Nature had reserved for the laboratory of the living body. The work of Prof. Fischer belongs in part to this class; amongst other work he has produced by synthesis from inorganic sources many definite sugars, and in so doing has greatly extended the territory of chemistry into the domain of physiology. Rather than speak of Mr. Wallace's work, I would set him forth as an example of that chivalrous feeling which one would wish men of science should always exhibit. You all know the story of how Wallace had worked out the theory of natural selection and was ready to publish; of how he learnt that Darwin had worked it out further and worked at it earlier, and how he postponed his own publication till Darwin had time to take the first place. When we read of the noble work which is being done in France and in Germany by Pasteur and by Koch, and others, we feel with much bitterness that we do not live in a free country. The work which Dr. Ferrier has done on the brain proves that we have men here as capable of physiological discovery by experiment as anywhere abroad, and that, if there is fear that we may fall behind, it is because our investigators are unnecessarily hampered in their work. My own case in physics is very analogous to Dr. Ferrier's in physiology—we are both of us professional men, we both of us desire to further the pure science of our subjects on lines suggested by our professional work. I say deliberately that if I had been obliged to obtain the sanction of a Government Department to make experiments or to make them in a licensed place it is very little experimental work I could have done; I should not have been in the proud position of one of your medallists to-day. Neither physics nor physiology can be efficiently advanced by mere observation: the more powerful method of experiment is necessary. If we must have laws restraining our best men, let us at least admit what it costs us. Speaking for myself, looking back, I have been fortunate in my surroundings. My father cultivated in me a taste for science from a time before I can remember, my mother gave me the first systematic instruction of which I have any recollections. If my father gave me my first taste for science, you may be sure that taste was encouraged at Owens College. Mathematics is the most essential weapon of the physicist, and nowhere can mathematics be learned as at Cambridge. I owe to Sir William Thomson the first impulse to experimental work in electricity and magnetism. He has been to me for many years the kindest of friends, always ready to encourage and to help. Looking at the present, I admit that your Council, in awarding me a Royal Medal, have raised me not a little in my own estimation. There is one point of view from which this cannot be regretted, if a man's past work obtains for him honour from the highest and most competent tribunal: surely that should make him feel that it is incumbent upon him to endeavour to do more and better work of the same kind. This, gentlemen, speaking for the other medallists and for myself, is the best thanks we can return you—to endeavour to justify you in the future in giving us these honours to-day."

LETTERS have been received from Mr. J. Graham Kerr, Naturalist to the Pilcomayo Expedition, dated from the s.s. *Bolivia* on that river, in lat. 24° 58′ S., long. 58° 40′ W., on October 4 last. The vessel had got so far up the Pilcomayo with great difficulty, owing to the extreme shallowness of the water, and had stuck exactly in the same spot since June 14. They had almost given up all hope of ever getting out, when on October 4 a relief party of twenty soldiers reached them and brought assistance. Some of the soldiers and Captain Page's son (Captain Page himself having died on August 2, whilst proceeding to Corrientes for medical advice) came back immediately by land, while Mr. Graham Kerr and the remainder of the party proposed to return down stream in the *Bolivia*. If that turned out to be impossible, it had been determined to burn the boat, and return to the La Plata overland. The Pilcomayo Expedition must therefore be considered to be at an end.

THE Scientific Committee of the Royal Horticultural Society have undertaken, under the direction of Dr. D. H. Scott and Dr. Francis Oliver, to investigate the effects of London fogs on cultivated plants. The Royal Society has granted £100 in aid of the experiments.

MANY horticulturists feel that there should be some permanent memorial of the services rendered by the late Mr. Hibberd to horticulture. A meeting, therefore, will be held to take the matter into consideration.

THE authorities of the Natural History Museum have placed in the Central Hall of that institution a small temporary exhibit, consisting of a set of highly magnified daawings of Bacteria. It includes such prominent forms as *Bacillus tuberculosis*, Koch, and the *Bacillus* of fowl cholera, and is the work of Dr. W. Migula.

THE Board of Agriculture proposes the appointment of a widely representative body under whose direction all examinations in dairy work shall in future be held.

THE Photographic Society has now secured premises which are likely to be suitable for its work. At the meeting of the Society on November 11, Mr. W. S. Bird gave all necessary information on the subject. The new quarters are "in a fine building of considerable architectural pretension," exactly opposite the centre of the British Museum. They consist of one large room, capable of holding about sixty persons; a smaller room, suitable for a library; a good dark-room; and a smaller one for a similar purpose.

THE workshop accommodation of the Physical Laboratory in the University College of Wales, Aberystwith, has recently been considerably extended, and arrangements are being made for a course of instruction in electrical engineering. The recent additions include a Crossley D. high-speed electric lighting engine, Crompton dynamo (shunt and compound-wound), and a Crompton D.D. arc lamp, &c.

THE following lectures on scientific subjects will be delivered at the Royal Institution before Easter:—Prof. Dewar, six Christmas lectures to juveniles, on frost and fire; Prof. Victor Horsley, nine lectures on the structure and functions of the nervous system (part i. the spinal cord, and ganglia); Prof. C. Meymott Tidy, three lectures on modern chemistry in relation to sanitation; the Right Hon. Lord Rayleigh, six lectures on the forces of cohesion. The Friday evening meetings will begin on January 23, when a discourse will be given by the Right Hon. Lord Rayleigh on some applications of photography; succeeding discourses will probably be given by Lord Justice Fry, Prof. J. W. Judd, Prof. A. Schuster, Dr. E. E. Klein, Mr. Percy Fitzgerald, Dr. J. A. Fleming, Dr. Felix Semon, Prof. W. E. Ayrton, and other gentlemen.

THE second series of lectures given by the Sunday Lecture Society begins on Sunday afternoon, December 7, in St. George's Hall, Langham Place, at 4 p.m., when Sir James Crichton Browne, F.R.S., will lecture on "Brain Stress." Lectures will subsequently be given by Mr. Whitworth Wallis, Mr. Edmund Gosse, Mr. Eric S. Bruce, Dr. Henry Hoole, Sir R. S. Ball, and Prof. G. S. Boulger.

EARLY on Monday morning the inhabitants of the valley of the Ness, in Inverness-shire, were alarmed by another shock of earthquake. The *Times* says that a slight tremor was felt shortly before midnight, and this was followed about ten minutes past 12 o'clock by a sharp shock, accompanied by a low rumbling noise. People were awakened by the shaking of their houses, but the shock was of short duration, and was not so serious as that experienced a fortnight ago.

THE United States National Electric Light Association will hold its thirteenth convention at Providence on February 17, 18, and 19, 1891. The following subjects will be dealt with:—How can the National Electric Light Association best serve central station interests? by C. R. Huntley; distribution of steam from a central station, by F. H. Prentiss; distribution and care of alternating currents, by T. Carpenter Smith; municipal control of electric railroads, by M. W. Mead; the Ferranti system, by C. B. Haskins. *Science* says that the committee has not only secured the promise of these papers, but has named a person to open the discussion on each paper—a plan which can hardly fail to increase the value and interest of the proceedings.

IN his message to Congress, presented on Monday, President Harrison said Congress would be asked to provide means for the acceptance of the invitation of Italy to take part in a Conference to consider the adoption of a universal prime meridian. He further suggested the passing of a general law giving the Executive discretionary authority to accept foreign invitations to Conferences having for their objects international reforms in science, sanitation, &c.

THERE is much complaint among American men of science with respect to the effect of the McKinley Bill on the cost of scientific instruments. The tax on microscopes has been raised to 60 per cent., so that a microscope which can be bought in Germany for 94 dollars costs in the United States 150.40 dollars. "Not content," says the New York *Nation*, "with the attack on the microscope, McKinley increased the duty on mathematical glass instruments from 45 to 60 per cent. *ad valorem*. Everybody knows the importance of glass tubes in laboratory work; well, the brave McKinley increased the tax on them from 40 to 60 per cent. Everyone knows the value of telescopes in astronomy and navigation. McKinley has increased the duty on them from 45 to 60 per cent. His keen protective eye also fell on 'raddle,' a substance used in polishing lenses for microscopes and telescopes, so he put the duty on that at 1.50 dollars per ton. What rate per cent. this is we are unable at this moment to say, but nobody but an ignorant barbarian would have taxed it at all. Everyone knows the value of spy-glasses on shipboard. McKinley has raised the tax on them from 45 to 60 per cent., and to prevent cheap navigation he has raised the tax on compasses from 35 to 45 per cent. Glass disks for optical instruments he has also raised from 45 to 60 per cent. He has done the same thing by glass tubes for thermometers."

THE Fishery Board for Scotland has issued a memorandum on the present state of the shore and sea fisheries of Scotland, by Dr. T. Weymss Fulton, secretary for scientific investigations. His review of the subject brings out the following facts:—(1) That the shore fisheries, especially those for lobsters, crabs, oysters, and mussels are steadily declining. (2) That the number of fishermen, the number of fishing-boats, and the value of the boats and gear, are decreasing. (3) That the number of Scottish beam-trawlers is increasing. (4) That the number of English beam-trawlers which have forsaken the less productive fishing-grounds off the English coast and have resorted to those lying off the Scotch coast is increasing year by year.

THE Pilot Chart of the North Atlantic Ocean, issued by the Hydrographer of the United States, shows that the month of October was very stormy north of a line from Bermuda to the British Isles. The month opened with a severe storm about 500 miles north-east from Newfoundland, and pressures below 28·61 inches. There was also at this time a storm in the North Sea, which appears to have originated off Cape Sable on September 27. A marked feature of the month was the existence of a great anticyclone extending from the Azores to near the British Isles, which caused the storms originating to the west of it to take a north-east instead of an east-north-east direction. Considerable fog was reported off the Banks and west of the Irish Channel, but the amount for the month was probably not greater than the average. More ice than usual for the time of year was reported off the Banks as far south as the 45th parallel.

Symons's Monthly Meteorological Magazine for November contains a climatological table for the British Empire for 1889. These interesting results of a certain number of well distributed stations, prepared from the summaries published in the *Magazine* each month, have been continued for many years, and, as the author points out, the extremes are monopolized year after year by the same stations. The highest temperature in the shade was 109°·0 at Adelaide on January 13; for the last five years Adelaide has recorded the highest temperature in the shade, reaching 112°·4 in 1886. It had also the highest temperature in the sun, 170°·7, and was the driest station during the year, having a mean humidity of 63 per cent. The lowest shade temperature was recorded at Winnipeg, on February 23, – 42°·6; only once does any other station come within 20° of it. It had also the greatest range in the year, the greatest mean daily range, 24°·5, the lowest mean temperature, and the least rainfall, 14·95 inches. The highest mean temperature was 80°·5, at Bombay, and the greatest rainfall 73·79 inches, at Trinidad. London was the most cloudy and the dampest station, the mean humidity being 81 per cent. The brightest station was Malta, which had little more than half the cloud of London.

SPEAKING a few days ago at Agra College, the Viceroy of India expressed his approval of the proposal to add scientific and technical training to the curriculum at Indian Colleges, and hoped that it would tend to stimulate and resuscitate some of those arts and industries for which India was famous in by-gone days. If this is really the result, it will be a striking instance of the importance of scientific and technical instruction.

A NOVEL whaling expedition is about to be undertaken by three American whalers—*Hume*, *Grampus*, and *Nicoline*—which have gone to the Arctic regions to winter at the mouth of the Mackenzie River. In order to be well supplied with food, they have taken what will last for two years, and they expect also to get food from the whalers in the summer. This is the highest point any whaler has reached, being 1000 miles from the North Pole. Directly the ice breaks after the winter, the whales come to the mouth of the river in great numbers to feed, and it is expected that a large number of them will be secured. If the experiment proves successful, it will cause a revolution in the whaling industry, as vessels at present have to spend several months on the voyage to good whaling-ground, and then have only a very short time for hunting.

THE new number of the Journal of the Marine Biological Association of the United Kingdom (new series, vol. i., No. 4) opens with a list of governors, founders, and members. In addition to the report of the Council for the year 1889–90, and the director's report, it contains the following papers:—Notes on recent experiments relating to the growth and rearing of food-fish at the Laboratory; report on the surface collections made by Mr. W. T. Grenfell in the North Sea and West of Scotland, by G. C. Bourne (with plate); notes on the herring, long-line, and pilchard fisheries of Plymouth during the winter 1889–90, by W. Roach; notes on the hydroids of Plymouth, by G. C. Bourne (with plate); a complete list of the Opisthobranchiate Mollusca found at Plymouth, by W. Garstang (with plates); notes and memoranda—(1) colour-changes in *Cottus bubalis*, by J. T. Cunningham, (2) note on the British Palæmonetes (*P. varians*), by W. F. R. Weldon, F.R.S.

HAZELL'S Annual for 1891 has been published. This is the sixth year of issue, and we need scarcely say that the volume contains a vast mass of useful information, clearly arranged. In the additions included in the present issue the editor has been careful to keep the work well up to date.

TO the new number of the Natural History Transactions of Northumberland, Durham, and Newcastle-upon-Tyne (vol. x., Part 2), Mr. R. Howse contributes a note on the South Durham salt borings, with remarks on the fossils found in the magnesian limestone cores, and the geological position of the salt; a catalogue of the local fossils in the Museum of the Natural History Society; and a catalogue of the fishes of the rivers and coast of Northumberland and Durham and the adjacent sea. The number also contains the report of the Committee for 1888–89.

THE Geological Survey of New Zealand has issued its reports of exploration during 1888–89, with maps and sections. The Director, Sir James Hector, notes that the Department was very fully represented at the Melbourne Exhibition by collections and maps illustrating the geological structure and mineral wealth of the colony. He also mentions that, as a contribution to the work of the Australasian Association for the Advancement of Science, a complete census of the mineral species which have been found in New Zealand has been compiled, together with the localities where found, the names of the first discoverers, and the dates. From this census it appears that 237 species are now recorded.

MESSRS. DULAU AND CO. have published a catalogue of the botanical works which they offer for sale. It includes a large number of valuable books relating to Phanerogamia.

IN 1865, Mr. J. G. Lockhart, while serving as an officer of the Hudson Bay Company, wrote some interesting notes on the moose in the far north of British America. These notes have been preserved in the archives of the Smithsonian Institution, and now appear in the Proceedings of the National Museum. Referring to the hunting of the moose, Mr. Lockhart says the most usual way is to approach the animals on snow-shoes or on foot, as only a hunter knows how, and shoot them. The old men who are not able to walk much in deep snow make a kind of fence of three poles tied equidistant from each other, a little taller than a man, stretching, perhaps, for two days' march between lakes, or a lake and a river, or between two mountains, or in any particular place where the moose are accustomed to pass. Spaces are left vacant here and there in this fence, and in these snares are set. In autumn, during the rutting season, the hunter carries with him the clean, dried shoulder-blade of a moose, and when he hears the call of the male moose, which is audible at a distance of several miles, he rubs the shoulder-blade against a small, dry tree and imitates the call of the male. The moose, as soon as he hears the sound, imagines, no doubt, that it is another moose, and runs in the direction, till met by a shot. The male is very dangerous at that season, especially when wounded. Many years ago, before guns and ammunition found their way into the country, the Indians used to build snow embankments near favourite feeding places, and lie hid there for days until a moose should chance to pass near, when they would kill him with arrows.

THE U.S. Department of Agriculture has issued the third of a series of papers entitled "Contributions from the U.S. National Herbarium." It consists of a list of plants collected by Dr. Edward Palmer in 1890, in Lower California and Western Mexico. Great interest was felt in Dr. Palmer's trip to La Paz and vicinity, and his collection is said to have added much to what was previously known regarding the flora of that region.

AN interesting paper is communicated by Prof. von Hofmann to the current number of the *Berichte* upon the dissociation of carbon dioxide gas into carbon monoxide and oxygen by means of the electric spark. Dalton and Henry long ago showed that carbon dioxide, although formed by exploding a mixture of two volumes of carbon monoxide with one volume of oxygen by the passage of an electric spark, is again partially decomposed into carbon monoxide and oxygen by the continued passage of the spark. This dissociation, however, is very slow, and usually incomplete. Hofmann and Buff, in the course of their well-known work upon gaseous reactions, further showed that "the electric spark passes through carbon dioxide with a violet glow, producing at first a rapid increase in the volume, which, however, becomes less and less marked until at the expiration of about half an hour the separated carbon monoxide and oxygen recombine with a sudden explosion, the re-formed carbon dioxide at once commencing to be again dissociated." Deville and Berthelot afterwards investigated the same phenomena, and also found that the reaction was never complete, proceeding only until about 28 or 29 per cent. of the carbon dioxide was decomposed, but they never observed any explosive recombination as described by Hofmann and Buff. Prof. Hofmann has therefore determined the exact conditions under which the explosive recombination occurs. It certainly appears somewhat remarkable that the same spark can effect both dissociation and recombination, yet such, within the limits described in the memoir, is an actual fact. The first essential point to be observed is the length of path of the spark; the most suitable distance apart of the platinum terminals appears to be between two and a half and three millimetres, and Prof. Hofmann advises the use of adjustable terminals rather than the ordinary platinum wires fused into the side of the eudiometer. A Leyden jar in the circuit renders the occurrence of periodical explosions more certain. The spark should also pass at about a quarter the height of the gas column instead of, as usual, near the top. The current itself, moreover, should not be too strong; that from two Bunsen cells and only a moderate sized Ruhmkorff coil is quite sufficient, and yields the best results. It is also preferable to use a volume of carbon dioxide, previously dried over oil of vitriol, not exceeding ten cubic centimetres at a pressure of 650–700 mm.; eight c.c. give excellent results. Under these conditions the first explosion usually occurs in 15–20 minutes, and sometimes earlier. The flame commences in the neighbourhood of the spark, and then perceptibly spreads through the whole length of the gas column. It is coloured blue in the first explosion, and green in the succeeding ones owing to the volatilization of a little mercury vapour. The second and succeeding explosions occur after shorter intervals than the first. This experiment is certainly one of the most interesting in all the range of dissociation phenomena, and full details, with drawings of the apparatus, are given by Prof. Hofmann in his memoir.

The additions to the Zoological Society's Gardens during the past week include an Ocelot (*Felis pardalis*) from South America, presented by Mr. J. H. Bennett; a Common Fox (*Canis vulpes* ♀) from North Wales, presented by Mr. B. Myddelton Biddulph; two Cape Zorillas (*Ictonyx zorilla* ♀ ♀) from South Africa, presented by Mr. R. Southey; two Ring-necked Parakeets (*Palæornis torquatus*) from India, presented by Miss S. L. Hands; ten Thunder-fish (*Misgurnus fossilis*) from the Baltic Sea, five Golden Orfe (*Leuciscus orfus*), European fresh waters, purchased.

OUR ASTRONOMICAL COLUMN.

The Variations in Latitude.—The most important question discussed at the International Conference on Degree Measurement held at Freiburg on September 15 was that of the variability of terrestrial latitudes. The Central Bureau, represented by Drs. Helmert and Albrecht, communicated two notes, one by Dr. Albrecht, "Resultate der Beobachtungsreihen betreffend die Veränderlichkeit der Polhöhen," the other by Dr. Marcuse, "Resultate der fortgesetzten Berliner Beobachtungsreihen betreffend die Veränderlichkeit der Polhöhen." These papers, and a general account of the whole question of variation in latitude, first raised by Prof. Fergola at the Conference of Rome (1883), is given by M. Tisserand in the *Bulletin Astronomique* for September. The method adopted in the observations made at the different stations is that of Horrebow. It consists in forming nine groups, each containing eight or nine couples of stars, two groups at least being observed each evening. The two stars of each couple were of almost equal magnitude; their difference in right ascension was comprised between 3m. + 15m., and that of their meridian zenith distances between ± 12′, whilst the meridians were never separated more than 27°. By choosing such stars, and taking the arithmetical mean of the differences of zenith distances of the two components, the small error due to an imperfect knowledge of the movement of the micrometer wire is eliminated. At each station a number of couples of stars ranging from 1400 to 1700 have been observed during the whole of 1889 and the first three months of 1890. It is evident that if the same couple of stars could be observed throughout the year, during the day as well as the night, the variations in latitude could be obtained independently of the errors of the absolute declinations of the two stars, provided that we knew exactly the variations of these declinations during the whole interval of observation. These variations depend on the motion of the terrestrial axis (precession and nutation), on aberration, annual parallax, and proper motion. It is impossible to work in this way for two reasons, (1) stars cannot be observed in the day-time by means of the instruments employed; (2) only a very small number of observations could be made. The groups of stars referred to above have been formed in order to avoid these inconveniences, for the differences, from the mean declinations, of each of the couples may be used as if only a single couple had been observed. When the necessary corrections are applied to the calculations it is found that the latitudes of Berlin, Potsdam, and Prague, indicate clearly a diminution of about 0″·5 from August 1889 to February 1890. The observations made at Berlin from April 15 to August 30 in this year show an increase of 0″·4 in the latitude of this place during the interval considered, and point to a period of about a year. The fact that the latitude of a place is subject to an annual periodic variation is not entirely new, for Gaillot discussed 1077 observations of latitude made between 1856 and 1861. On arranging the observations according to the month in which they were made, the following differences from the mean value were obtained (*Annales de l'Observatoire de Paris*, p. 319):—

	Paris.	Potsdam.		Paris.	Potsdam.
	″	″		″	″
January ...	−0·23 ...	−0·11	July	+0·25 ...	+0·19
February...	−0·06 ...	−0·07	August ...	+0·16 ...	+0·17
March ...	−0·03 ...	−0·04	September	+0·13 ...	+0·10
April... ...	−0·03 ...	0·00	October ...	−0·07 ...	−0·03
May	+0·10 ...	+0·05	November	−0·11 ...	−0·14
June	+0·16 ...	+0·14	December	−0·27 ...	−0·26

These observations, therefore, indicate a difference of almost half a second between the observed latitudes in January and July. M. Nobile has discussed, from the same point of view, the observations made at Greenwich, Milan, Oxford, Pulkova, and Washington (*Bulletin Astronomique*, vol. v. p. 544). The Greenwich observations show a maximum of latitude in July and August, and a minimum in December and January, the amplitude of the variation being nearly 1″. At Washington a minimum also occurs at the end of the year, but at Milan it occurs in May. The Oxford observations show a maximum in the autumn, whilst those made at Pulkova do not appear to present any periodic variation with the seasons. But although these results are somewhat contradictory, those communicated at Freiburg clearly demonstrate the existence of a variation of 0″·5. It remains to be seen how the amplitude and the phase of the variation is affected by passing from the northern to the southern hemisphere, or when observations are made at two stations having appreciably the same latitude, but widely separated in longitude.

The cause of the variation has yet to be found. M. Tisserand has shown ("Traité de Mécanique céleste," vol. ii. p. 489) that the transportation of a mass of water, 0·10m. thick, from latitude + 45° to − 45°, and covering a tenth of the earth's surface, may cause the principal axis to move 0″·16. The weight of a column of water 0·10m. thick, is equal to that of a column of mercury 0·007m. thick, hence considerable changes in the barometric pressure may have an appreciable effect on the direction of the earth's axis. That the variations are connected with the succession of the seasons is manifest. This seems to indicate that temperature plays an important part, and that the variation is a result of the varying amount of heat received throughout the year by the atmosphere and the instruments. The theories of refraction require the atmosphere to have a regular constitution and a statical condition that is probably never realized. If the constitution varies with the season, the refractional effect must also change, and this may cause the difference in the observations of latitude.

Another probable cause was suggested by M. D. Lamey at the meeting of the Paris Academy on November 17. He showed that if the atmospheric tidal effects be calculated for each month in the year, the values obtained followed a curve very similar to that derived from the observed differences in latitude. That the sun and moon produce atmospheric tides must be incontestable. The physical consequence is that refraction phenomena must also vary with the tidal effect, and therefore the positions of stars may experience an annual periodic fluctuation comparable with that observed. The cause wherein lies the solution of the problem can only be definitely determined, however, after a more extended study than has yet been made.